Bertil Nordenstam:

the architect behind modern Senecioneae classification

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DOI: http://dx.doi.org/10.53875/capitulum.02.2.01

ABSTRACT

Bertil Nordenstam is a Swedish botanist who contributed significantly to the understanding of the Compositae during a career of over 60 years. Nordenstam's botanical work centered on the tribe Senecioneae, a group that he re-circumscribed and modified taxonomically with his many insights into its internal relationships. Nordenstam also participated in major floristic projects, and he collected extensively around the world. He wrote about botanical history with an emphasis on the Linnean disciple Carl Peter Thunberg and he served the community of fellow synantherologists by editing the Compositae Newsletter for 25 years.

Keywords: Compositae, *Euryops*, Japan, Namibia, *Othonna*, South Africa, Sweden, Thunberg.

INTRODUCTION

For all of us interested in Compositae, no matter where we are, the Senecioneae cannot be neglected. It is the largest tribe of all in the Compositae and it is found everywhere (Nordenstam et al., 2009; Pelser et al., 2007). Literally one in ten Compositae is a Senecioneae, and it includes the most species-rich genus of the family, *Senecio* L., which despite much reclassification needs further taxonomic investigation. The tribe is relatively easy to identify, given the uniseriate involucre (Figure 1).

As with almost any large group in the Compositae, the taxonomic recognition of the Senecioneae is found in the classic works of Henri Gabriel Alexandre de Cassini from the early 1800s (Bonifacino et al., 2009). His 20th century successor, who has contributed most to the understanding of the systematics of this important group, is Bertil Nordenstam.

Bertil's contributions to botany extend beyond the realm of synantherology; he has worked with several other plant families and dedicated a considerable amount of time to botanical history and floristic studies. Our objective with this paper is to present some facets from the botanical life of this notable Swedish botanist.

BERTIL'S EARLY LIFE AND EDUCATION

Bertil was born on February 20, 1936, in the small town of Nyköping South of Stockholm in Sweden, as the second of five brothers. His father had medical problems and was hospitalized; Bertil and his brothers were all young boys when his mother was left alone to take care of the family. After the end of World War II, they moved to the city of

VERSION OF RECORD FIRST PUBLISHED ONLINE ON **30 MARCH 2023**

Göteborg on the West coast of Sweden, where Bertil continued his education.

"My mother was a remarkable woman working hard to keep her five sons alive and happy. We learned to be independent and did well at school until matriculation [end of high school]. *I enjoyed the summer vacations in various places in Sweden, but usually on the West coast. From the age of ten I spent most of my summers in nature, collecting sea shells, bird´s eggs (not recommended today!) and I enjoyed drying plants. In a couple of years I had assembled a herbarium of 600 Scandinavian plants."*

Bertil was encouraged by his uncle, Sten Nordenstam, who inspired him to pursue a career in the natural sciences. Sten was a forester by profession but also an eminent amateur botanist with a deep knowledge of the Scandinavian flora. He took a special interest in the largely apomictic genera *Hieracium* L. and *Taraxacum* Weber ex F.H.Wigg., each with hundreds of microspecies. Almost every summer as a teenager Bertil would join his uncle on excursions, mainly in the northern mountains of Sweden, Norway, and Finland, but also to the big islands of the Baltic Sea.

After matriculation in 1954 Bertil had already set his mind to become a professional botanist and he decided to study at Lund University in South Sweden. Bertil's M.Sc. from Lund 1958 was based on chemistry, zoology and botany. He obtained some temporary positions as assistant at the Department of Botany at Lund University and was thus able to embark on his career as a botanist.

Lund not only offered Bertil a path to become a professional botanist, but also was the setting where he met his future wife Gunilla, in the same university, where she was studying to become a teacher.

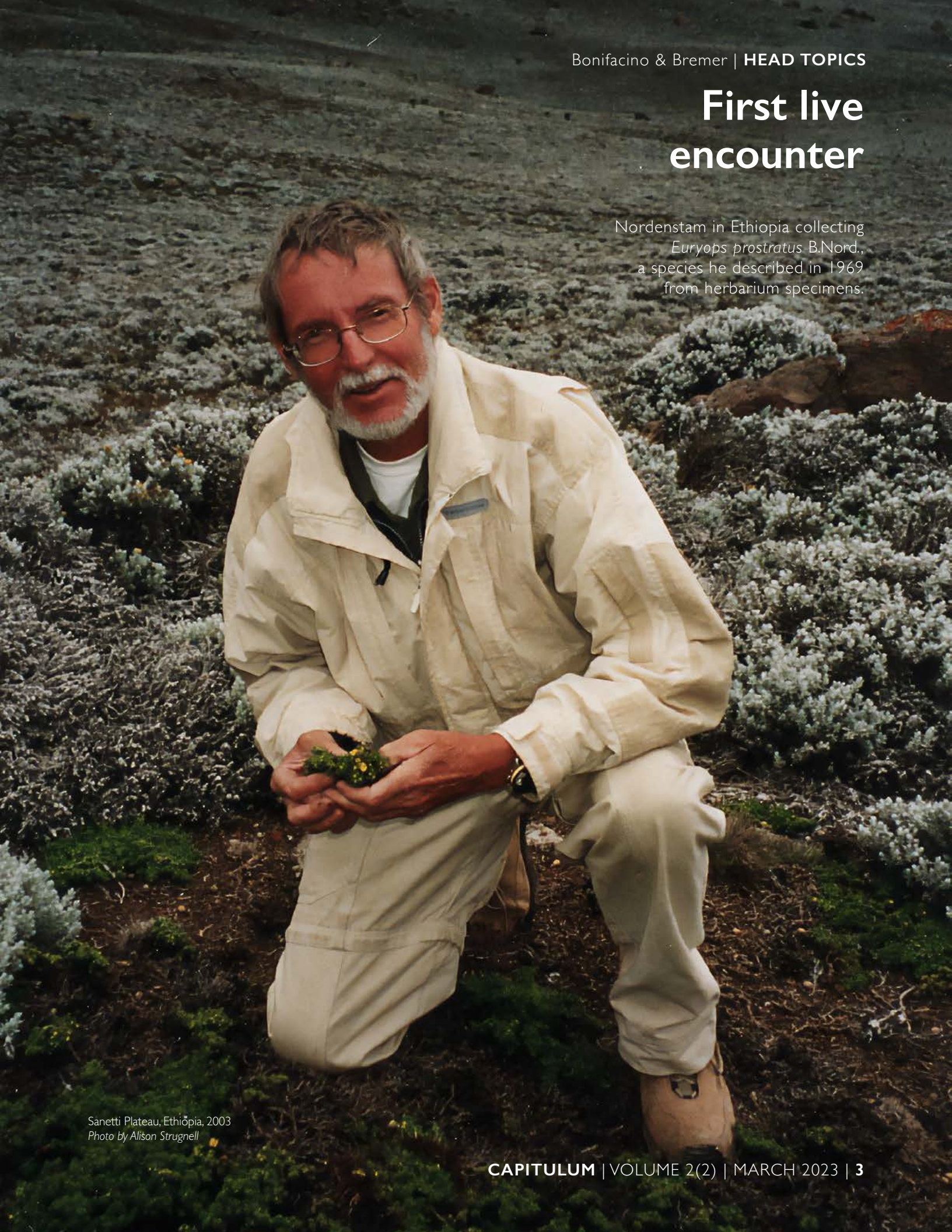
"Gunilla was an outstanding beauty and a Swedish champion in figure skating, and also much interested in nature, wildlife and adventure. We married in 1966 and were blessed with one daughter Felicia, who is now a Ph.D. and a medical doctor. We travelled together to many countries on all continents but Antarctica, just like the Compositae!"

Figure 1. *Lamprocephalus montanus* B.Nord., a representative of the Senecioneae from the Cape Province in South Africa together with a red-flowered species of *Erica* L.. Note the uniseriate involucre typical of the Senecioneae, sometimes as in this plant also with a small outer calyculus. *Lamprocepehalus* is one of 50 Compositae genera described by Nordenstam. *Photo by Bertil Nordenstam*

After completing his M.Sc. Bertil started working on his Ph.D., initially focusing on the South African genus *Othonna* L. in the Senecioneae, following a suggestion by the curator at the botanical museum in Lund, Tycho Norlindh. He was a specialist on the tribe Calenduleae and had travelled in southern Africa in the 1930s. Norlindh was the first in a long series of Swedish Compositae taxonomists among them Nordenstam and the co-author of this article, Kåre Bremer.

First live encounter

Nordenstam in Ethiopia collecting *Euryops prostratus* B.Nord., a species he described in 1969 from herbarium specimens.



Sanetti Plateau, Ethiopia, 2003
Photo by Alison Strugnell

When Bertil embarked on his Ph.D. studies Norlindh moved to Stockholm where he was appointed professor and director of the botanical museum at the Swedish Museum of Natural History, and Bertil had to pursue his Ph.D. research essentially on his own. He started to look at *Othonna* in the herbarium and was soon disappointed with the poor quality and the ugly nature of the herbarium specimens. Many *Othonna* species are succulents and they are difficult to press and render dull specimens where a lot of information is missing, hardly sufficient for a successful revision.

> *"I remember my friend Hermann Merxmüller in Munich later telling me he considered Othonna to be the most difficult genus of the Compositae, at least in Africa."*

While looking at the specimens of *Othonna* in the herbarium, Bertil came across the related *Euryops* (Cass.) Cass., a genus of attractive African shrubs with well-preserved specimens. *Euryops* was in obvious need of revision and he decided to tackle this group instead, a decision that proved very convenient.

Bertil told the professor at the Department of Botany, Henning Weimarck, that he wanted to write his Ph.D. thesis on *Euryops* and Weimarck replied something like "Good, come back to me when you are finished." Back in those days Ph.D. studies were more of an enterprise you took on your own rather than an education with teachers and supervisors. Bertil´s Ph.D. work was no exception, and he had to pursue it largely without support or guidance.

After a survey of the major European herbarium collections of *Euryops* (in London, Geneva, Paris among others) it was time to study *Euryops* in its natural environment. Bertil travelled in South Africa extensively between 1962 and 1964, a remarkable collecting endeavour to which we will return below.

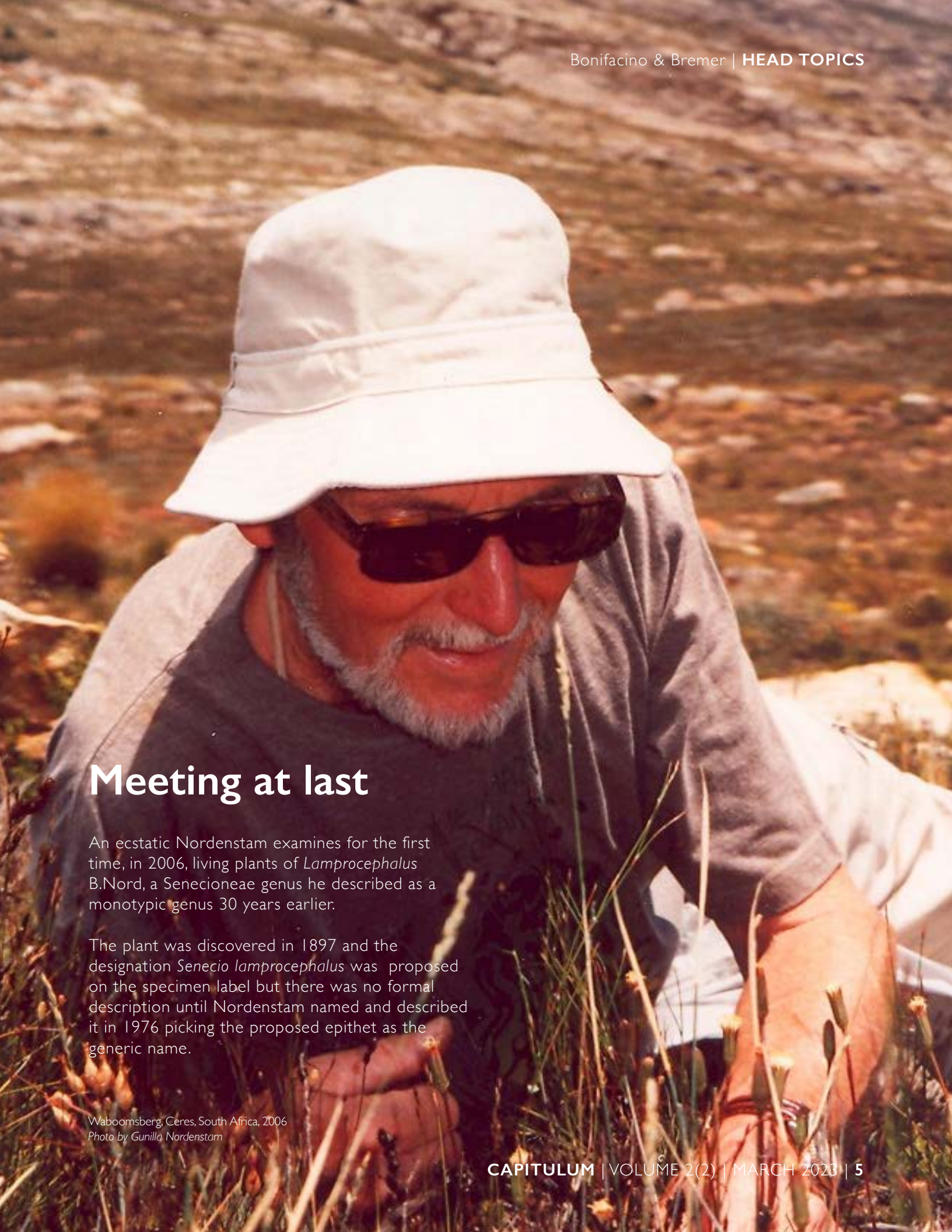
Having returned to Lund from South Africa Bertil worked to complete his revision of *Euryops*, working at the same time between 1966-1968 as a lecturer at the Department of Botany. His taxonomic revision of *Euryops* for which he received his Ph.D. recognized 97 species and was published in the monograph series *Opera Botanica* in 1968 together with a supplement on morphology and cytology.

THE SYNANTHEROLOGIST

Immediately after obtaining his Ph.D. Bertil applied for and was appointed curator at the Swedish Museum of Natural History where Tycho Norlindh was professor and director. Norlindh was soon to retire, and Bertil hoped to succeed him, but after a long application process in 1972 the position went to the more senior Rolf Santesson, a lichenologist from Uppsala. Later in 1980 the professorship was divided in two and the botany department in two sections, for phanerogams and cryptogams, respectively. Bertil then became professor for the phanerogams and Santesson remained as professor for cryptogams. Bertil kept this position until he retired in 2001. During this period, he was periodically commissioned to serve also as deputy museum director, director of research, and director of botany at the museum.

The first symposium entirely devoted to the study of Compositae was held in Reading, England, in July 1975 (Heywood et al., 1977). At this occasion, Bertil assumed his position as the leading specialist on the Senecioneae. The organizers Vernon H. Heywood, Jeffrey B. Harborne and Billie L. Turner assumed that George Bentham´s 19th century tribal classification of the family was essentially correct and that there was a need only for a few transfers of misplaced genera and minor recircumsciptions of the tribes. Consequently, they had asked a selected group of participants to present, at the symposium, an update of Bentham's tribal classification with a list of genera for each tribe.

Bertil was asked by the organizers to do the Senecioneae. The result was the first major redefinition of the tribe since its very creation as he did away with elements introduced by Lessing and perpetuated by De Candolle, i.e., some Anthemideae, Calenduleae and an assorted array of tribes currently part of the Heliantheae alliance, most notably the Helenieae, and partly kept by Bentham as well as further modified by the addition of the Liabeae. Bertil wanted none of that and presented the first narrow definition of the Senecioneae (Nordenstam, 1977). He included not only a revised list of genera with details of number of species, general habit, and distribution, but most notably a discussion on the morphological



Meeting at last

An ecstatic Nordenstam examines for the first time, in 2006, living plants of *Lamprocephalus* B.Nord, a Senecioneae genus he described as a monotypic genus 30 years earlier.

The plant was discovered in 1897 and the designation *Senecio lamprocephalus* was proposed on the specimen label but there was no formal description until Nordenstam named and described it in 1976 picking the proposed epithet as the generic name.

Waboomsberg, Ceres, South Africa, 2006
Photo by Gunilla Nordenstam

SENECIONEAE CIRCUMSCRIPTION ACROSS THE AGES

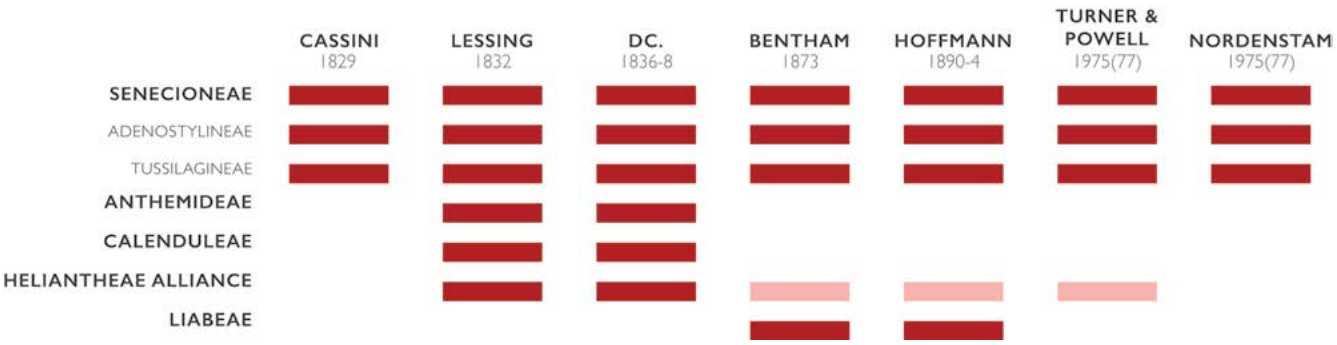


Figure 2. Circumscription of Senecioneae across the ages. Nordenstam was the person behind the new circumscription which ordered all Senecioneae discovered since the time of Cassini, proposing a narrow definition for the tribe which in a sense was a return to the original concept.

and chemical evidence supporting the new definition. He somewhat reluctantly recognized two subtribes, Blennospermatinae (currently not recognized and including the still troublesome *Abrotanella* (Gaudich.) Cass.) and Senecioninae. Of much importance, inside the latter he outlined the existence of two more or less defined morphological groups, the "cacalioid" assemblage composed by taxa largely characterized by cylindric filaments, continuous stigmatic surfaces, and lack of calyculus; and the "senecioid" assemblage characterized by balusteriform filaments, stigmatic surfaces in two marginal bands, and the presence of a calyculus.

What is interesting from a historical perspective is that at the same meeting some participants argued for another, much broader circumscription of the Senecioneae (Turner & Powell, 1977). This alternative classification conflicted with that of Bertil in the sense that it maintained elements of the Helenieae inside the Senecioneae, most notably *Arnica* L. and related genera. Bertil offered a compelling list of eighteen characters that strongly supported his definition. The proceedings of the Reading meeting were eventually published by Heywood et al. (1977) in "*The Biology and Chemistry of the Compositae*", where Bertil's treatment of a narrowly defined Senecioneae was included. His circumscription of the tribe, with the exclusion of the helenioid elements, was followed by subsequent workers and is now strongly supported by robust phylogenies based on molecular data (Figure 2).

Bertil's review of the Senecioneae for the Reading meeting was soon followed by a milestone in the history of the Senecioneae, his classic Opera Botanica volume from 1978, "Taxonomic studies in the tribe Senecioneae" (Nordenstam, 1978). In this work Bertil continued building on his definition of the tribe by drawing attention to microcharacters, which he considered essential in subtribal and generic taxonomic classification, echoing what Harold E. Robinson and Robert M. King had done for the Eupatorieae (King & Robinson, 1970, 1987). Bertil presented detailed descriptions of the endothecial wall thickenings, the filament shape, the shape of epidermal cell on true ray corollas, and the presence and shape of calcium oxalate crystals, all of significance for clarifying relationships inside the Senecioneae. Furthermore, he included a detailed and lavishly illustrated account on the shapes of style branches. In this publication he also described 22 new genera (Table 1) and proposed over 170 new combinations .

Focusing on the characters that revealed taxonomic affinities and with an understanding of the biogeography of the different groups,

Felicia nordenstamii

Felicia nordenstamii Grau is described by the German synantherologist Jürke Grau, a specialist in the tribe Astereae. It grows on coastal lime rocks at Cape Agulhas, the southernmost tip of the African continent. The plant is of course named in honour of Nordenstam and it has a special significance for him, since he has a daughter named Felicia. There is also another *Felicia* Cass. species connected with the Nordenstam family, i.e. *Felicia gunillae* B.Nord. which Nordenstam named after his wife Gunilla. *Felicia gunillae* grows near the summit of Brandberg in Namibia and was one of the undescribed species Nordenstam discovered when he successfully climbed the mountain in 1963.

Near Arniston (South Africa), Limestone Fynbos vegetation
Photo by Amida Johns

Overhauling the Senecioneae

Through a series of seminal papers, most notably the 1977 presented at the Reading meeting and the *Opera Botanica* from 1978 plus many other subsequent works, Nordenstam redefined the tribe based most notably on morphological grounds that were later nonetheless corroborated with molecular data.

Major morphological characters used were styles as illustrated here, but also the shape of the filament collar and its constitutive cells, the thickenings in the endothecium cells, and the presence of calcium oxalate crystals in achene walls among other microcharacters.

Senecio crassiflorus DC.,
Photo by Mauricio Bonifacino

STYLE

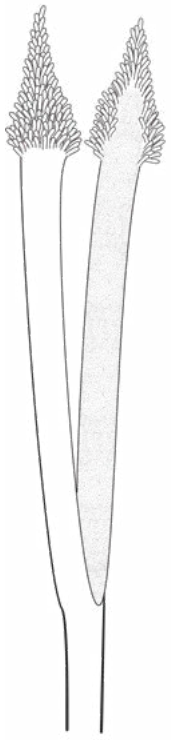
key character in Senecioneae taxonomy

Illustrations redrawn from Nordenstam (1978)

Stigmatic surface continuous

Style branches acuminate covered with collecting trichomes

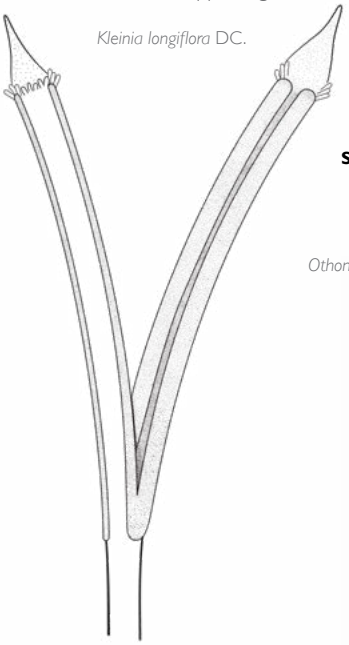
Jacmaia incana (Sw.) B.Nord.



Stigmatic surface in two marginal bands

Style branches acuminate with ring of collecting trichomes at base of sterile appendage

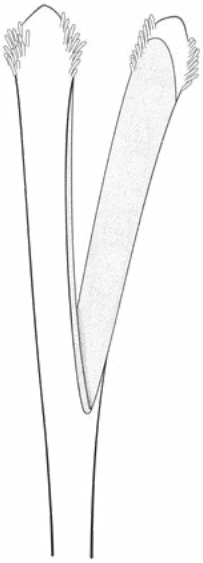
Kleinia longiflora DC.



Stigmatic surface continuous

The stigmatic surface extends to dorsal surface giving the appearance of marginal bands

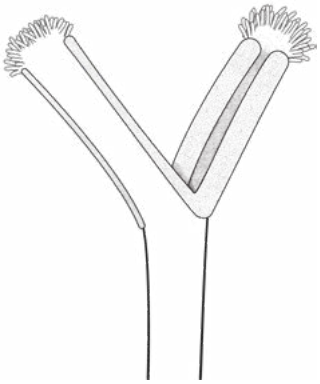
Odontocline tercentenariae (Proctor) B.Nord.



Stigmatic surface in two marginal bands

Style branches truncated with apical tuft of collecting trichomes

Senecio eligulatus B.Nord.



Undivided style branches

Sterile styles of disk florets

Othonna brandbergensis B.Nord.

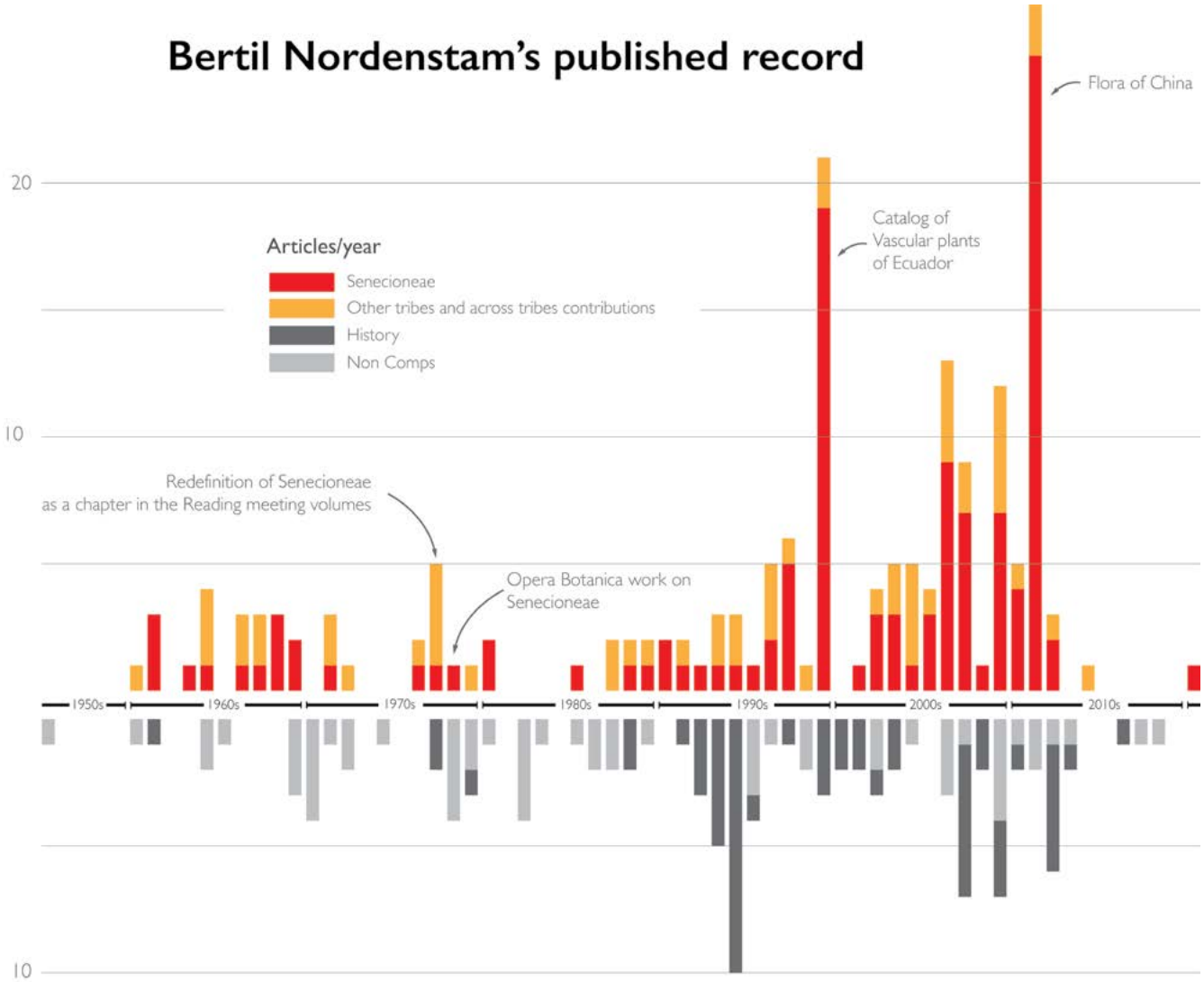


Figure 3. Summary view of Nordenstam's publication record illustrating the dominance of articles about Compositae in general and Senecioneae in particular. Note also the many publications on botanical history.

Bertil continued his work on Senecioneae, and eventually published over 120 scientific articles exclusively dedicated to this tribe. His work on the Compositae, however, has not been limited to the Senecioneae, and he published works in several other tribes, notably in the Calenduleae, Gnaphalieae, and Anthemideae (Figure 3).

"I think students should focus on the continued refinement of the circumscription of Senecio, still a very large group, and also in figuring out its geographical origin."

THE EXPLORER

Bertil has a long track of fieldwork experience, which began together with his uncle Sten Nordenstam. When he came to Lund for his academic studies he joined a senior colleague at the Department of Botany, Hans Runemark, on a collecting trip to Greece in 1960. They rented a fishing vessel and collected nearly 4,000 specimens during three months on many islands in the Aegean sea from Crete to the Northern Sporades. It was during this trip that Bertil became used to intense field work, a characteristic that stayed with him for life.

Namaqualand

Echoing South America's Patagonia, Namaqualand or the land of the Nama Khoe people in the southern end of Africa covers nearly 500000 km^2 and is a synantherologist wonderland. Nordenstam traveled and collected extensively across this territory.

Skilpad camp, Namaqua National Park, South Africa
Photo by Martie De Wijn

In May 1962 Bertil travelled to South Africa mainly to collect *Euryops* for his Ph.D. thesis. He remained there for two years and had the opportunity to visit many remote places, also in Namibia and Lesotho. The trip was made possible by a grant from the National Botanic Garden of South Africa, viz. the Smuts Memorial Fellowship. He was also granted a modest sum (10,000 SEK = approximately 1,000 Euros in today's money) from the Swedish Natural Science Research Council. He purchased a Volvo station wagon to be delivered in Cape Town and assembled a substantial amount of fieldwork equipment and supplies.

In what could be seen as a modern retake of Thunberg's voyage, Bertil's own travel to South Africa was also by sea and made possible by friends in a shipping company that granted him a free voyage from a Norwegian port to Cape Town. The voyage took 32 days including stops at several ports. Since the vessel did not carry passengers, Bertil was listed as a crew member, officially as secretary to the captain, although his only duty consisted of playing bridge with the captain and two other officers each night.

Bertil was well received by the staff at the National Botanic Garden at Kirstenbosch and its Compton Herbarium, where well-known botanists such as Dr. Richard Compton were still active, together with Miss W.F. Barker and Mrs. J. Lewis. After some time in a nearby hotel, he was provided accommodation in a small cottage in Kirstenbosch. This became his base for the following two years, although he was most of the time away in his Volvo collecting plants.

At the time of Bertil's arrival in late austral fall, the weather was cold and rainy in the southwestern Cape, so he spent the first weeks checking specimens in the herbarium and planning his collecting trips. The local botanists suggested many localities where they themselves had done much successful collecting. Most visitors would have followed these suggestions and visited the known localities. Not so Bertil, he noted these localities on his maps and decided to avoid them. He wanted to explore new areas.

After some initial trips in the southwestern fynbos region, Bertil headed north towards Namaqualand. He was fortunate that 1962 was a year with much winter rains that resulted in a prodigious spring flowering. Everywhere the ground was covered in flowers, many of them Compositae. One locality especially worth mentioning is Knersvlakte in the Vanrhynsdorp division. The name alludes to the crackling sound made by the wagon wheels when the first settlers entered the stony and gravelly flats of the area. At Knersvlakte the ground is covered by pebbles and gravel of quartz, an environment filled with endemic plants. Bertil was apparently the first botanist to collect extensively at Knersvlakte, a botanical paradise where he discovered many new species. One day in July 1962, Bertil found three new Compositae and one Iridaceae species which he described later (*Leucoptera subcarnosa* B.Nord., *Othonna hallii* B.Nord., *Pentzia pedunculariis* B.Nord., *Babiana lewisiana* B.Nord.). At University of Cape Town there was a specialist on succulent Aizoaceae, Mrs. L. Bolus, and Bertil collected living specimens for her. She described three new species discovered by Bertil at Knersvlakte and named them after him (as well as a fourth species collected by Bertil in Namibia). Knersvlakte is now a nature reserve.

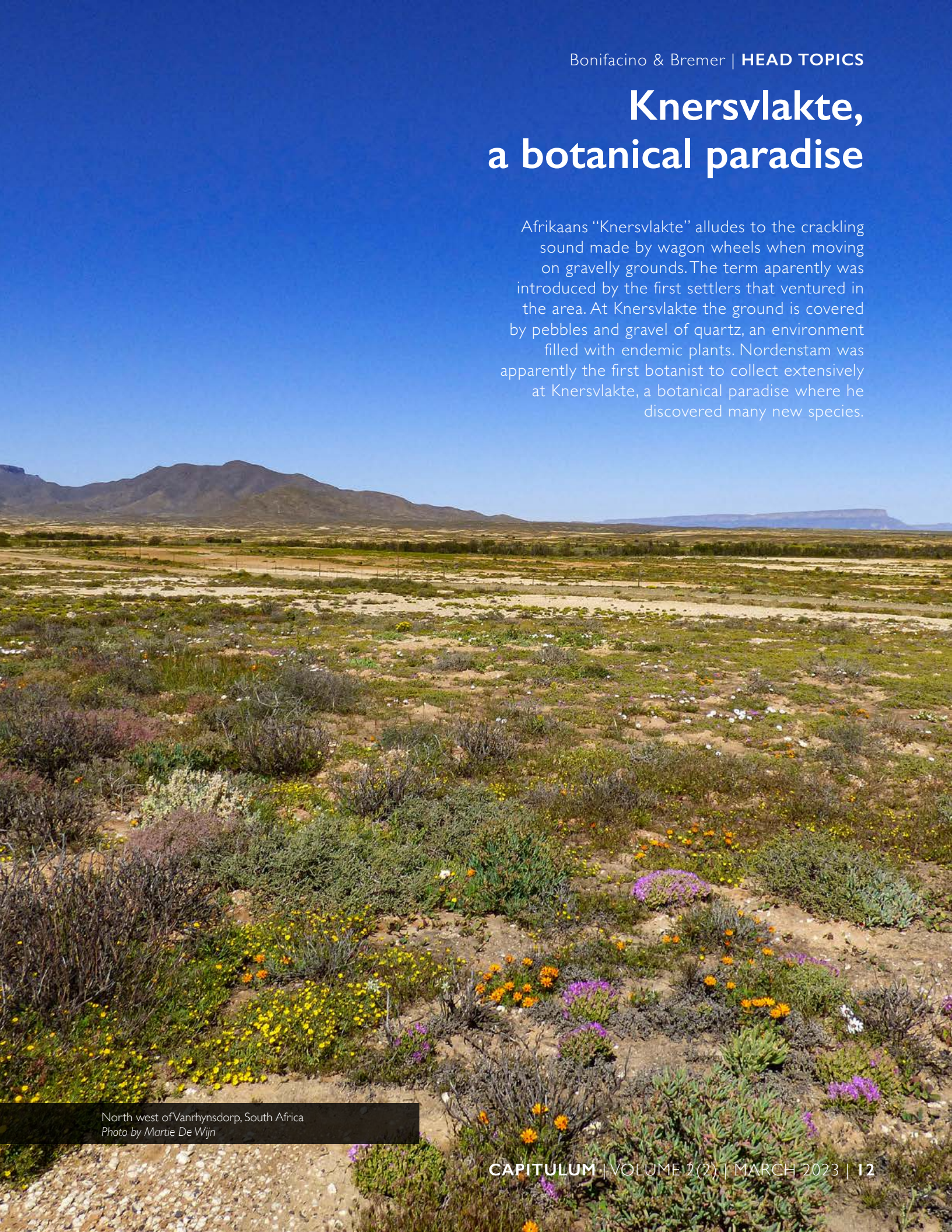
Bertil continued further north through Namaqualand all the way to Richtersveld, the remote northwest corner of South Africa where he also discovered and collected several new species. Among them were four new Compositae species: *Helichrysum jubilatum* Hilliard, *Pteronia anisata* B.Nord., *Pteronia elata* B.Nord., *Oedera nordenstamii* (K.Bremer) Anderb. & K.Bremer.

In 1963 Bertil travelled to Namibia, at that time a protectorate administered by South Africa. He was accompanied by a Swedish globetrotter of the same age, Wilhelm "Ville" Flensburg, who spent his time travelling to remote places. Bertil had met him in Cape Town and Ville cancelled his plans to move on to South America and decided to accompany Bertil on his botanical expeditions. Ville was not interested in plants, but he was a good cook and companion, and he liked the exotic places Bertil planned to visit. In Namibia Bertil´s most remarkable collecting trips were those carried out to the Brandberg massif, its highest mountain.

Brandberg is a massive granite outcrop 2,585 m above sea level, surrounded by the Namib desert (Figure 4). No botanists had visited the uppermost regions. According to local botanists of the time, the mountain probably housed the same plants as the region in

Knersvlakte, a botanical paradise

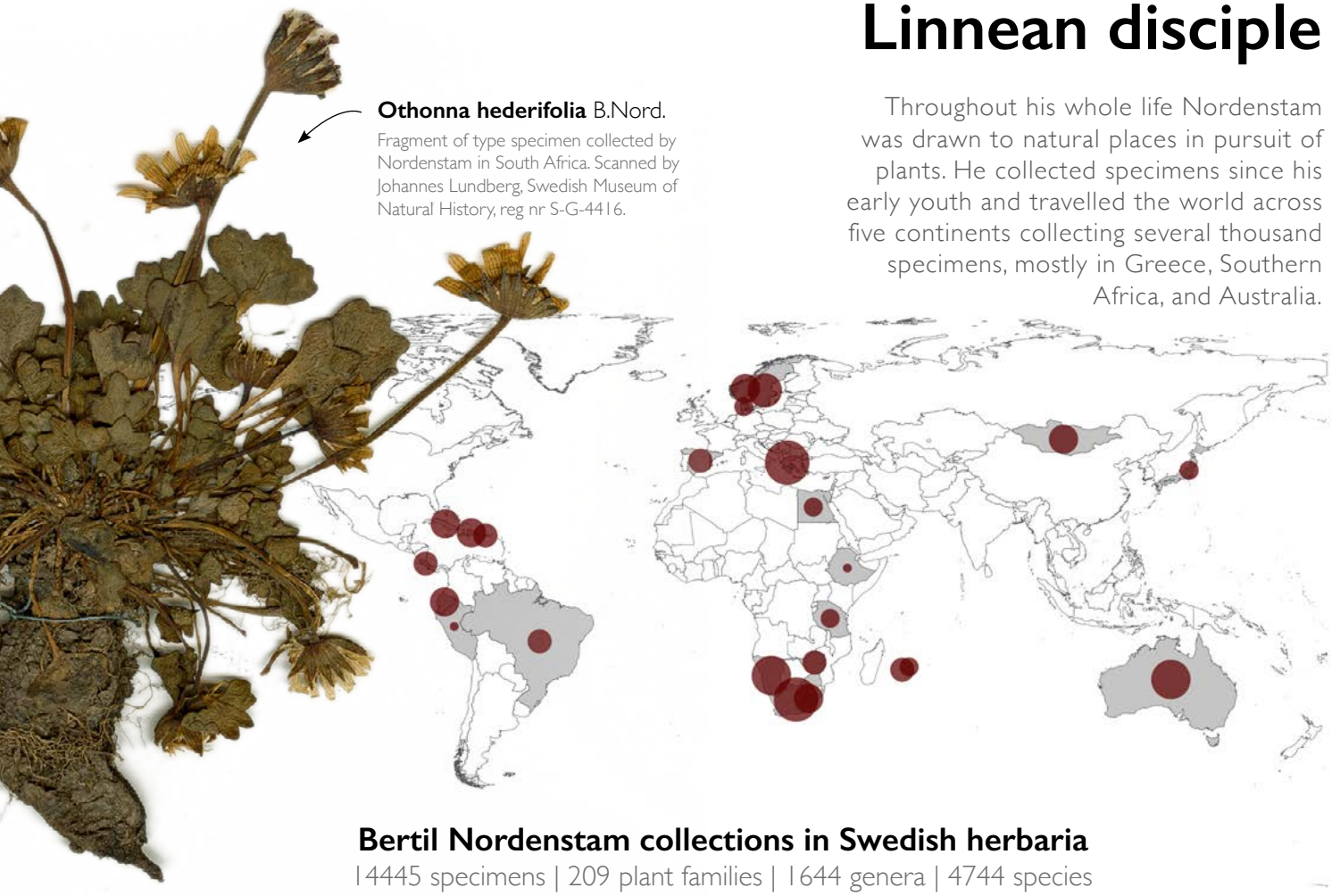
Afrikaans "Knersvlakte" alludes to the crackling sound made by wagon wheels when moving on gravelly grounds. The term aparently was introduced by the first settlers that ventured in the area. At Knersvlakte the ground is covered by pebbles and gravel of quartz, an environment filled with endemic plants. Nordenstam was apparently the first botanist to collect extensively at Knersvlakte, a botanical paradise where he discovered many new species.



North west of Vanrhynsdorp, South Africa
Photo by Martie De Wijn

A 20th century Linnean disciple

Throughout his whole life Nordenstam was drawn to natural places in pursuit of plants. He collected specimens since his early youth and travelled the world across five continents collecting several thousand specimens, mostly in Greece, Southern Africa, and Australia.

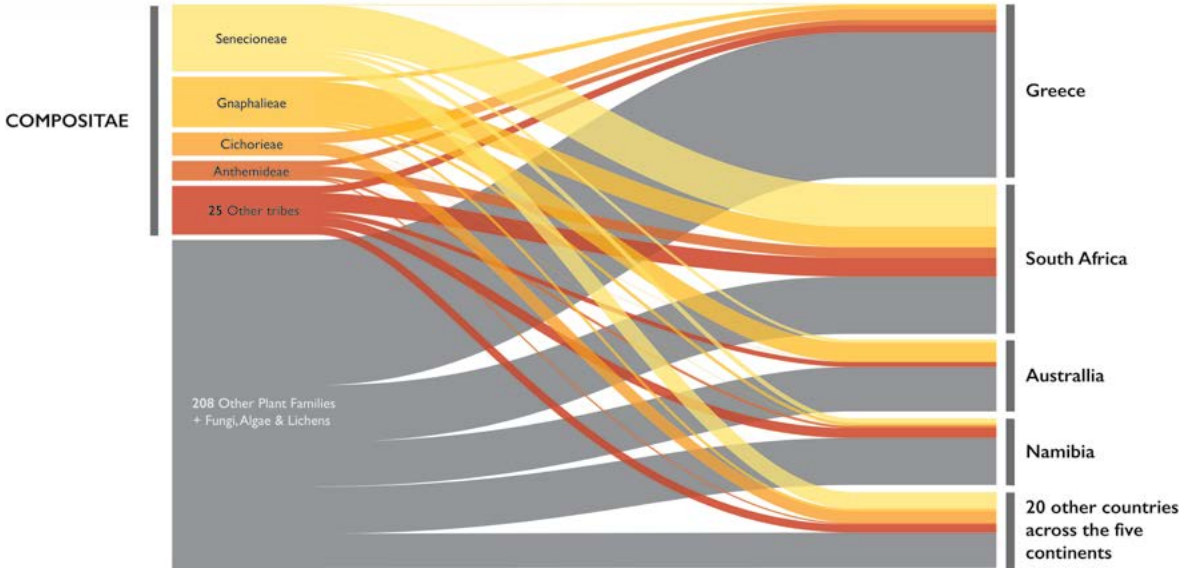


Othonna hederifolia B.Nord.

Fragment of type specimen collected by Nordenstam in South Africa. Scanned by Johannes Lundberg, Swedish Museum of Natural History, reg nr S-G-4416.

Bertil Nordenstam collections in Swedish herbaria

14445 specimens | 209 plant families | 1644 genera | 4744 species



Data obtained from Sweden's Virtual Herbarium available at http://herbarium.emg.umu.se
Records represent specimens collected by Nordenstam as either main or accompanying collector. Duplicates in herbaria outside Sweden are not included and could account for similar numbers of specimens in those herbaria as Nordenstam typically collected duplicates to leave at the country where he collected and to send to other herbaria in the specimen exchange programs at S.

Figure 4. Brandberg is a massive granite outcrop in the Namibian desert, reaching 2,585 m above sea level. When Nordenstam came to Namibia in 1963, at that time a South African protectorate, no botanists had visited the uppermost regions of the mountain. Local botanists assumed that the mountain housed the same plants as the region in general. Nordenstam suspected otherwise and decided to try and explore the upper regions. After five days of strenuous climbing in May 1963 Nordenstam and his companion Ville Flensburg reached the summit where they discovered about 10 species new to science.
Photo by Kåre Bremer.

general. Bertil suspected otherwise and so he set himself to botanize in the area during May-June 1963 and April 1964.

In the beginning of May 1963 Bertil and his companion Ville made a first attempt at exploring Brandberg and ascended along one of the valleys to 1,200 m. They turned back after five days, realizing that they needed more food and equipment to reach the summit. A couple of weeks later, in the end of May, they made a second attempt, with a heavy load of sleeping bags, blankets, field presses and food for about ten days. After five days of strenuous climbing, they reached the summit 31 May 1963.

Again, Bertil was fortunate, 1963 was like 1962 a year with exceptionally good rains resulting in abundant flowering. At the high plateau and on the way to the summit Bertil discovered and collected about 10 new species endemic to Brandberg, among them three Compositae species which he later named *Othonna brandbergensis* B.Nord., *Pentzia tomentosa* B.Nord. and *Felicia gunillae* B.Nord., the last one named after his wife Gunilla.

A true globetrotter

Nordenstam, a Swedish botanist who in pursuit of Compositae has traveled extensively accross the five continents.

Jamaica, 2013
Photo by Gunilla Nordenstam

In April 1964 Bertil and Ville returned to Brandberg. That year there was only little rain, and they were informed by the manager of the nearby tin mine, Mr. J. Botha, that climbing the mountain would not be possible due to lack of water. Instead Mr. Botha offered to fly them in his aeroplane, a Piper Cherokee 180, to a flat but stony strip on the upper plateau. After a dangerous landing on the stony ground, they were left on the mountain for two days until Botha came back to bring them home. A few weeks later Botha crashed when landing on the mountain. He survived and was saved by a rescue expedition.

Bertil's collections from this first journey to southern Africa (1962-1964) have been databased and filed into the S herbarium by Arne Anderberg, Bertil's successor as professor and director of botany at the Swedish Museum of Natural History. Arne Anderberg was impressed by the quality of the material, especially the many fine collections of the often succulent and difficult-to-press *Othonna*.

In 1974 Bertil published a Flora of Brandberg with a checklist of 357 species of vascular plants and an account of his expeditions to the mountain (Nordenstam, 1974; 1982). Bertil´s two years in South Africa comprised many other adventurous botanical expeditions and mountain climbings in the Cape Region, Namibia and Lesotho, but Knersvlakte and Brandberg were perhaps the most memorable places. In May 1964 Bertil flew back to Sweden.

Bertil has also collected extensively in Australia and the West Indies. Most of his collections are stored at the Swedish Museum of Natural History in Stockholm (S) but there are duplicates in many herbaria, especially at Lund university (LD). His fieldwork yielded over 14,000 specimens that have Bertil as collector, encompassing samples gathered in over 20 countries and representing 205 families, almost 40 % of them falling into the Compositae (5624 spp.), and 25 % of these falling into the Senecioneae (1805 spp.).

With this travel experience, having visited over 75 countries Bertil became a fellow of Travellers Club in Stockholm where he served as president for many years, and he was also elected Fellow International in the Explorers Club in New York.

THE HISTORIAN

In addition to his extensive record as plant systematist and taxonomist, Bertil developed a profound interest in the history of botany reflected in more than 50 contributions (Figure 3).

> *"Basic knowledge of the history of science is important and should be included in teaching and research to a greater extent than is currently the case. Students applying molecular techniques should be encouraged to reflect on the history and nomenclature of the taxa involved in their studies. Biology students of today may be ignorant of Linnaeus and his contemporaries, but he is always there because of taxonomic tradition and current rules of nomenclature. In these respects, taxonomy is different from most of modern biology and historical aspects are inevitable in most systematic studies."*

The collections at the Swedish Museum of Natural History (S) began as the natural history collections of the Royal Swedish Academy of Sciences, which was founded in 1739 by Linnaeus himself and five other scholars. As a curator of the herbarium, Bertil saw among all the more recent collections, many 18th century specimens collected by disciples of Linnaeus and also specimens annotated by Linnaeus himself.

When conducting taxonomic revisions involving Linnean names, it is important to know about Linnean disciples and their connections to other 18th and early 19th century botanists. It is not surprising that a Swedish botanist working in Sweden would become interested in some part of the whole universe surrounding Carl Linnaeus, arguably the most famous Swedish botanist of all.

Bertil became interested in botanical history early on, having his first article published on the matter commenting on some Linnean dissertations (Nordenstam, 1961). He has subsequently written books and many articles about Carl Peter Thunberg, Olof Swartz, and other old botanists (Hansen et al., 2012a, 2012b; Nordenstam & Hansen, 2012; Nordenstam, 2012).

Given Bertil's great interest in South African plants, he developed a particular interest in Thunberg, who made extensive collections there ("Father of South

Home is where the heart is

Southern Africa is the region where Nordenstam obtained nearly 25% of his collections, an area rich in Senecioneae, a group that he championed throughout his academic carreer.

Nordenstam collecting Compositae in Lesotho, 2003
Photo by Vicki Funk

Table 1. Compositae genera named by Bertil Nordenstam according to International Plant Names Index with geographic distribution and number of species included. *****

Tribe	Genera	Distribution	Species number
Senecioneae	***Acrisione*** B. Nord., Bot. Jahrb. Syst. 107: 582 (1985)	South America	2
	Aequatorium B. Nord., Opera Bot. 44: 59 (1978)	South America	13
	Antillanthus B. Nord., Compositae Newslett. 44: 51 (2006)	Cuba	17
	Capelio B. Nord., Compositae Newslett. 38: 72 (2002)	South Africa	3
	Caputia B.Nord. & Pelser, Compositae Newslett. 50: 59 (2012)	South Africa	5
	Caucasalia B. Nord., Pl. Syst. Evol. 206: 22 (1997)	Asia	4
	Crassothonna B. Nord., Compositae Newslett. 50: 71 (2012)	South Africa	14
	Dauresia B.Nord. & Pelser, Compositae Newslett. 42: 76 (2005)	Namibia	2
	Dendrosenecio (Hauman ex Hedberg) B. Nord., Opera Bot. 44: 40 (1978)	East Africa	12
	Dolichoglottis B. Nord., Opera Bot. 44: 33 (1978)	New Zealand	2
	Elekmania B.Nord., Compositae Newslett. 44: 66 (2006)	Hispaniola	9
	Graphistylis B. Nord., Opera Bot. 44: 56 (1978)	Brazil	9
	Herreranthus B.Nord., Compositae Newslett. 44: 62 (2006)	Cuba	1
	Ignurbia B. Nord.,Willdenowia spec. vol. 31, 1: 464 (2006)	Cuba	1
	Io B.Nord., Compositae Newslett. 40: 47 (2003)	Madagacar	1
	Iranecio B. Nord., in Rech. f. (ed.) Fl. Iran. 164: 53 (1989)	Asia	4
	Jacmaia B. Nord., Opera Bot. 44: 64 (1978)	Jamaica	1
	Lamprocephalus B. Nord., Bot. Notiser 125: 323 (1976)	South Africa	1
	Leonis B.Nord., Compositae Newslett. 44: 55 (2006)	Cuba Hispaniola	1
	Lomanthus B.Nord. & Pelser, Compositae Newslett. 47: 34-36 (2009)	Ecuador Peru Bolivia Argentina	20
	Lordhowea B. Nord., Opera Bot. 44: 38 (1978)	Australia Lord Howe Island	4
	Lundinia B.Nord., Compositae Newslett. 44: 64 (2006)	Cuba, Hispaniola	1
	Nemosenecio (Kitam.) B. Nord., Opera Bot. 44: 45 (1978)	China Japan Taiwan	6
	Nesampelos B.Nord., Compositae Newslett. 44: 58 (2006)	Hispaiola	3
	Odontocline B. Nord., Opera Bot. 44: 23 (1978)	Jamaica	6
	Oldfeltia B.Nord. & Lundin, Compositae Newslett. 38: 66 (2002)	Cuba	1
	Oresbia Cron & B. Nord., Novon 16:216 (2006)	South Africa	1
	Phaneroglossa B. Nord., Opera Bot. 44: 66 (1978)	South Africa	1
	Sinosenecio B. Nord., Opera Bot. 44: 48 (1978)	China to Indochina	44
	Stenops B. Nord., Opera Bot. 44: 73 (1978)	Tanzania Zimbabwe	2
	Urostemon B. Nord., Opera Bot. 44: 31 (1978)	New Zealand	1
	Zemisia B.Nord., Compositae Newslett. 44: 71 (2006)	Central America	2
Anthemideae	***Adenanthellum*** B. Nord., Bot. Notiser 132: 160 (1979)	South Africa	1
	Adenoglossa B. Nord., Bot. Notiser 129: 137 (1976)	South Africa	1
	Cymbopappus B. Nord., Bot. Notiser 129: 150 (1976)	South Africa	3
	Hilliardia B. Nord., Opera Bot. 92: 147 (1987)	South Africa	1
	Leucoptera B. Nord., Bot. Notiser 129: 140 (1976)	South Africa	3
Gnaphalieae	***Anderbergia*** B. Nord., Ann. Wiener Mus. Naturgesch. 98: 407 (1996)	South Africa	6
Astereae	***Roodebergia*** B. Nord., Acta Phytotax. Geobot. 53: 101(2002)	South Africa	1

***** Nordenstam described 11 additional genera that have been synonymyzed: SENECIONEAE: ***Canariothamnus*** B.Nord. Compositae Newslett. 44: 24–31 (2006) = ***Bethencourtia*** Choisy in Buch, Phys. Beschr. Canar. Ins.: 148 (1825); ***Iocenes*** B. Nord., Opera Bot. 44: 58 (1978) = ***Senecio*** L., Sp. Pl. 2: 866 (1753); ***Notoniopsis*** B.Nord., Opera Bot. 44: 69 (1978) = ***Kleinia*** Mill., Gard. Dict. abr. ed.: 4 (1754); ***Xyridopsis*** B.Nord., Opera Bot. 44: 75 (1978) = ***Psednotrichia*** Hiern, J. Bot. 36: 289 (1898). ANTHEMIDEAE: ***Adenanthemum*** B.Nord., Bot. Not. 129(2): 157 (1976) = ***Adenanthellum*** B. Nord., Bot. Notiser 132: 160 (1979); ***Scyphopappus*** B.Nord., Bot. Not. 129(2): 147 (1976) = ***Argyranthemum*** Webb, Hist. Nat. Iles Canaries (Phytogr.). 3(2.2, livr. 44). t. 90 (1839). GNAPHALIEAE: ***Comptonanthus*** B.Nord., J. S. African Bot. 30: 54 (1964) = ***Ifloga*** Cass., Bull. Sci. Soc. Philom. Paris 1819: 142 (1819). CALENDULEAE: ***Inuloides*** B.Nord., Compositae Newslett. 44: 44 (2006) = ***Osteospermum*** L., Sp. Pl. 2: 923 (1753); ***Monoculus*** B.Nord., Compositae Newslett. 44: 39 (2006) = ***Osteospermum*** L., id.; ***Nephrotheca*** B.Nord. & Källersjö, Compositae Newslett. 44: 33 (2006) = ***Osteospermum*** L., id.; ***Norlindhia*** B.Nord., Compositae Newslett. 44: 41 (2006) = ***Osteospermum*** L., id. Note that generic classification of Calenduleae is still being discussed and researched. It is a matter of opinion whether ***Osteospermum*** should be widely circumscribed to include most species of the Calenduleae, as it is in the International Plant Names Index, or reclassified into a number of monophyletic genera, as is advocated by Nordenstam.

Figure 5. Japanese Emperor Akihito visited Sweden in connection with the 300th anniversary of Linnaeus' birth. From left Swedish Queen Silvia, Japanese Emperor, Swedish King Carl XVI Gustaf, Japanese Empress Michiko, and Nordenstam showing books about Carl Peter Thunberg. Stockholm, May 2007.
Photo by Swedish Museum of Natural History.

African Botany") and also in Japan ("Japan Linnaeus"). As described above, Bertil spent considerable time in South Africa and visited Japan a total of 24 times, although he was not able to do much collecting there.

In 1976 he was invited to speak about Thunberg at the 200th anniversary of his visit to Japan. On that occasion Bertil was invited to meet Emperor Hirohito, who had a strong interest in biology, botanical history (especially Thunberg's visit to Japan in 1776), and had assembled a substantial herbarium on the premises of the Imperial Palace. Bertil would later also meet with Emperor Akihito (Figure 5) and the present Emperor Naruhito while the latter was Crown Prince.

Bertil´s interest in historical botanists was not restricted to Linnean disciples. He also wrote a book about Erik Leonard Ekman (1883-1931) who spent his life collecting in the Caribbean where he discovered more than 2,000 new species (Nordenstam & Oldfelt, 2007).

THE EDITOR

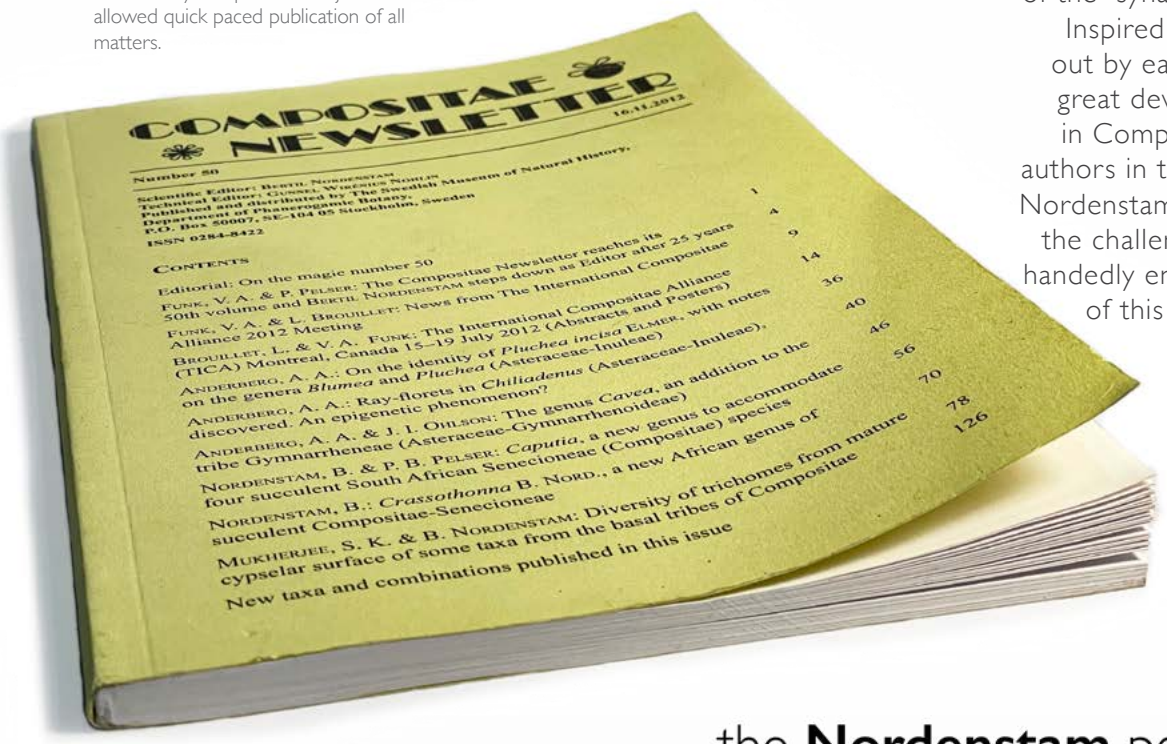
The first periodical exclusively dedicated to the Compositae, the Compositae Newsletter, was founded by Tod F. Stuessy and Robert M. King in 1975, and carried on for some time by Stuessy, Charles Jeffrey and Jette Baagøe. After passing through these editors, it was up to Bertil in 1988 to introduce the classic compact yellow format for which the Newsletter is remembered. Bertil not only introduced a change in format but more importantly he conducted his editorial duties during 25 uninterrupted years, the longest stretch for the journal.

An epoch making publication venue

COMPOSITAE NEWSLETTER

The Compositae Newesletter offered a communication venue in times with no internet or social media to connect people commonly interested in Compositae. It eventually morphed into a journal that allowed quick paced publication of all matters.

Over 260 articles were published in the COMPOSITAE NEWSLETTER, Nordenstam edited 80% of them, making possible the rapid publication of data from different areas of the synantherological world. Inspired by the work carried out by earlier editors and the great development of studies in Compositae from Swedish authors in the 1980s and 1990s, Nordenstam decided to take on the challenge to almost single-handedly ensure the publication of this journal for 25 years.



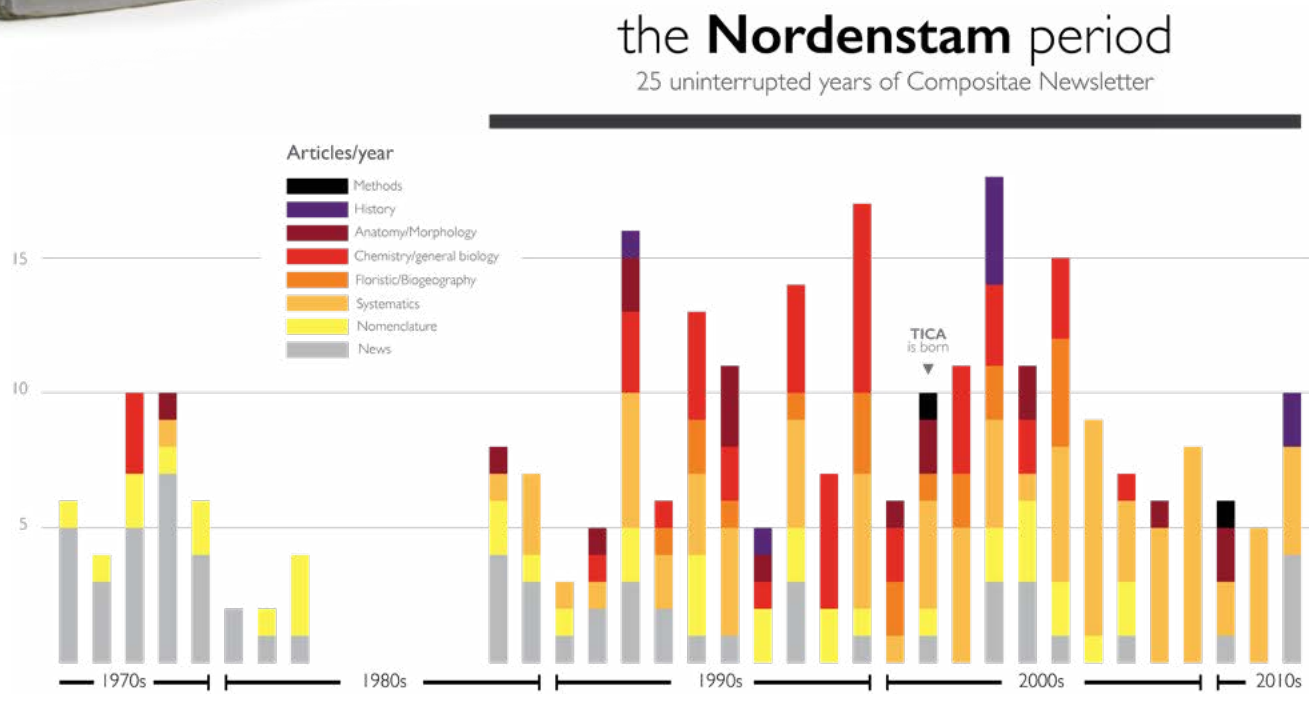


Table 2. Genera and species named after Bertil Nordenstam according to International Plant Names Index. *Hieracium nordenstamii* Rit Visindofj. Islend., Akureyri 37: 82 (1966) from Iceland, was named after Sten Nordenstam, not Bertil.

Family	Tribe	Taxa	Diversity & distribution
COMPOSITAE	Senecioneae	***Bertilia*** Cron, S. African J. Bot. 88: 14 (2013)	1 sp., South Africa
	Senecioneae	***Nordenstamia*** Lundin, Compositae Newslett. 44: 15 (2006).	16 spp., Ecuador, Peru, Bolivia, NW Argentina
	Senecioneae	***Euryops bertilii*** Vlok, S. African J. Bot. 133: 169 (2020)	Little Karroo
	Astereae	***Felicia nordenstamii*** Grau, Mitt. Bot. Staatssamml. München 9: 336 (1973)	Agulhas to Potberg coastal limestone rocks
	Astereae	***Nidorella nordenstamii*** Wild, Bol. Soc. Brot. sér. 2, 43: 230 (1969)	Namibia
	Gnaphalieae	***Oedera nordenstamii*** (K.Bremer) Anderb. & K.Bremer, Ann. Missouri Bot. Gard. 78(4): 1071 (1991); *Relhania nordenstamii* K.Bremer, Opera Bot. 40: 54 (1976)	Richtersveld
	Calenduleae	***Osteospermum nordenstamii*** J.C.Manning & Goldblatt, Bothalia 42(1): 62 (2012)	Namaqualand coastal plain Riethuis to Vredendal
AIZOACEAE		***Antimima nordenstamii*** (L.Bolus) H.E.K.Hartmann, Bothalia 28(1): 77 (1998) = *Ruschia nordenstamii* L.Bolus, J. S. African Bot. 30: 241 (1964).	Van Rhynsdorp
		Drosanthemum nordenstamii L.Bolus, J. S. African Bot. 30: 78 (1964)	Namibia
		Conophytum nordenstamii L.Bolus, J. S. African Bot. 29: 171 (1963) = ***Conophytum wettsteinii*** subsp. fragile (Tischer) S.A.Hammer, Gen. Conophytum 241 (1993)	Van Rhynsdorp
		Oophytum nordenstamii L.Bolus, J. S. African Bot. 28: 291 (1962) = ***Oophytum oviforme*** N.E.Br., Gard. Chron. ser. 3, 79: 48 (1926)	Van Rhynsdorp
ASPARAGACEAE		***Lachenalia nordenstamii*** W.F.Barker, J. S. African Bot. 49(4): 428 (1983)	Namibia

According to Bertil, he was inspired to do so due to the surge of Compositae research carried out in Stockholm. These years at the end of the 20th century stand out as a well-defined Swedish period in the history of study of Compositae.

When Bertil took over as editor of Compositae Newsletter, it was before internet, e-mail, and social media. Compositae Newsletter became a convenient vehicle for general research news in the Compositae, but also for publication of necessary taxonomic and nomenclatural changes and other synantherological matters. Bertil insisted that the journal was to be distributed free of charge to anyone interested and he always encouraged new readers.

CONCLUDING REMARKS

This review has been focused on Bertil's contributions to classification of the Senecioneae and on his remarkable field work carried out in South Africa. Bertil also pursued important work in other plant families, Colchicaceae to take one example, with his fine monographs of the genera *Ornithoglossum* and *Wurmbea*. His collecting trips went not only to Africa, but to other continents as well, notably southwestern Australia, and exotic places like Cuba, Lord Howe Island, and Mongolia. To give a fair review of all his botanical accomplishments necessitates a longer article.

Nordenstamia

Nordenstamia Lundin is an Andean genus of 16 species distributed from Ecuador to northern Argentina. The genus is distinctive in its alternate phyllotaxis, yellow ray corollas and style branches with pointed apical appendages.

Nordenstam has been honored with two genera and five species in Compositae and three species in two other plant families (Aizoaceae and Asparagaceae; Table 2).

Nordenstamia longistyla, Reserva Aguada Blanca, Arequipa, Perú
Photo by Edgar Heim

ACKNOWLEDGMENTS

First and foremost, we thank Bertil Nordenstam for accepting to be the subject of this paper and for his patience to endure several sessions of Q&A. His daughter Felicia Nordenstam supplied contact information. Amida Johns, Martie De Wijn and Edgar Heim allowed us to use their photographs to illustrate this article. Carol Kelloff from the US herbarium put at our disposal the photo collection of the late Vicki Funk and facilitated access to some literature. Arne Anderberg and Johannes Lundberg provided information about Nordenstam's collections at the S herbarium and granted permission to use the image of the *Othonna* type. Torsten Eriksson at University of Bergen helped with early suggestions on matters pertaining to this article and Ken Wurdack from the US herbarium assisted with editorial suggestions on early versions of the manuscript.

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